August 2019 Featured Articles, Volume 229

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Article 1: General Surgery
Success of hospital intervention and state legislation on decreasing and standardizing postoperative opioid prescribing practices. Zipple M, Braddock A. J Am Coll Surg 2019;229:158–163

Article 2: Burn, Trauma, Critical Care; General Surgery
Pulse pressure as an early warning of hemorrhage in trauma patients. Priestley EM, Inaba K, Byerly S, et al. J Am Coll Surg 2019;229:184–191

Article 3: Stomach, Esophagus; General Surgery
Clinical significance of esophageal outflow resistance imposed by Nissen fundoplication. Ayazi S, DeMeester SR, Hagen JA, et al. J Am Coll Surg 2019;229:210–216

Article 4: Burn, Trauma, Critical Care; General Surgery
Current burden of gunshot wound injuries at two Los Angeles County Level I trauma centers. Foran CP, Clark DH, Henry R, et al. J Am Coll Surg 2019;229:141–149

Objectives: After reading the featured articles published in this issue of the *Journal of the American College of Surgeons* (JACS), participants in this journal-based CME activity should be able to demonstrate increased understanding of the material specific to the article featured and be able to apply relevant information to clinical practice.

A score of 75% is required to receive CME and Self-Assessment credit. The JACS Editor-in-Chief does not assign a manuscript for review to any person who discloses a conflict of interest with the content of the manuscript. Two articles are available each month in the print version, and usually **4 are available online for each monthly issue, going back 24 months.**

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ARTICLE 1

(Please consider how the content of this article may be applied to your practice.)

Success of hospital intervention and state legislation on decreasing and standardizing postoperative opioid prescribing practices

Zipple M, Braddock A
J Am Coll Surg 2019;229:158–163

Learning Objectives: After study of this article, surgeons should be able to identify strategies to decrease postoperative opioid prescribing, standardize prescribing habits, and understand how to implement evidence-based prescribing recommendations for common outpatient surgical procedures.

Question 1

Regarding the opioid epidemic and surgeon contribution:

a) Opioid-naive patients are not at risk for chronic usage after operation, so opioids can be prescribed without reservation.
b) In recent literature, patients frequently report that they use 100% of their opioid prescriptions after operation.
c) New state and federal regulations are being passed across the country to ban the use of opioids after operation.
d) Patient surveys suggest that patients use only 30% of their postoperative opioid prescriptions.
e) Studies have shown that nonopioid medication prescriptions are unnecessary and should not be used in the postoperative setting.

https://doi.org/10.1016/j.jamcollsurg.2019.04.015
ISSN 1072-7515/19

Critique: The opioid epidemic has been well documented and publicized in the US during the past decade. Studies of postoperative patients suggest that excess prescriptions are common in surgical populations and that opioids can have negative consequences beyond the immediate perioperative period, including chronic usage. It has been suggested that only 30% of prescribed opioids are actually taken by postoperative patients. In an effort to address the severity of the epidemic, several states have also introduced legislation that limits opioid prescribing in opioid-naive patients (not to ban the use of opioids). Multimodal pain therapy, including nonopioid pain medications, should be used to decrease opioid prescribing.

Question 2

Regarding follow-up of the intervention in this study to decrease opioid prescriptions:

a) Patient satisfaction was confirmed by standardized surveys.
b) There were no unplanned hospital admissions and emergency department visits.
c) Patients were frequently discharged with no opioid prescription.
d) Patients with intraoperative or postoperative complications were found to require increased opioid prescriptions.
e) Pregnant patients were given nonopioid prescriptions.

Critique: This was a prospective study of opioid prescribing after intervention to decrease opioid use in the common surgical procedure. Patient satisfaction was not evaluated by this study. Unplanned admission and emergency department visits for pain control were evaluated, and there were no reported episodes during this study. Patients were almost universally given an opioid prescription in this study, despite more recent recommendations that perhaps nonopioid pain regimens can be appropriate in certain surgical populations. Finally, patients with intraoperative or postoperative complications, and pregnant patients, were excluded from this study due to the likelihood of increased pain requirements.

Question 3

This study demonstrates:

a) A significant increase in the number of opioids prescribed to postoperative patients after intervention
b) A significant increase in nonopioid pain medication prescribed to postoperative patients after intervention
c) No variation in opioid prescribing by type of procedure before or after intervention
d) Significant variation in opioid prescribing by surgeons before and after intervention
e) That patients use less medication when they are prescribed smaller prescriptions

Critique: This study demonstrates a significant decrease in the number of opioids prescribed to postoperative patients after intervention, a significant increase in nonopioid pain medication prescribed to postoperative patients after intervention, resolution of variation in opioid prescribing by type of procedure after intervention, and resolution of variation in opioid prescribing by surgeon after intervention. Patient satisfaction or use of prescriptions was not evaluated in this study.

Question 4

Regarding standardizing postoperative opioid prescribing efforts:

a) There is no literature to support that opioids can have negative consequences outside the immediate postoperative period.
b) Educational interventions have not been shown to be effective in decreasing opioid prescribing.
c) There are no evidence-based guidelines available to guide postoperative pain management.
d) Further efforts are needed to standardize and optimize postoperative management.
e) The Michigan Opioid Prescribing Engagement Network (MI-OPEN) guidelines are based on what would satisfy 100% of postoperative patients studied.

Critique: There is extensive literature to support that opioids can have negative consequences outside the immediate postoperative period, including chronic usage, even in opioid-naive patients. Educational interventions, such as this study, have been shown to be effective in decreasing opioid prescribing. Evidence-based guidelines are currently available to guide postoperative pain management from MI-OPEN. However, these guidelines were updated in 2019, and further efforts are needed to standardize and optimize postoperative management. In an effort to standardize postoperative prescribing, the MI-OPEN coordinated with the Michigan Surgical Quality Collaborative to establish prescribing

recommendations in opioid-naive patients with a recommended or "ideal" number of tablets to prescribe for common general surgery procedures. The recommended number was defined as the number of tablets that would satisfy 80% of patients' postoperative opioid usage.

ARTICLE 2

(Please consider how the content of this article may be applied to your practice.)

Pulse pressure as an early warning of hemorrhage in trauma patients

Priestley EM, Inaba K, Byerly S, et al
J Am Coll Surg 2019;229:184−191

Learning Objectives: After reviewing this article, readers will understand how pulse pressure measurements can be used as part of the initial assessment of injured patients, and will be able to incorporate this into their initial evaluation strategy in the resuscitation bay.

Question 1

In trauma patients who are not hypotensive, a narrowed pulse pressure (PP) is:

a) An independent predictor of active hemorrhage (AH) requiring blood product transfusion in patients who do not require intervention for hemorrhage control
b) An independent predictor of AH requiring blood product transfusion and intervention for hemorrhage control
c) Not associated with an increased need for the transfusion of blood products
d) An independent predictor of patients who will become hypotensive
e) Associated with AH requiring blood product transfusion only when accompanied by tachycardia

Critique: Hypotension, as determined by low systolic blood pressure, is a well-documented indicator of blood loss that will require blood product resuscitation and emergent therapeutic intervention for hemorrhage control. Before a patient becomes hypotensive, as intravascular volume is lost, the compensatory vasoconstriction that occurs will narrow the PP, providing an early signal that resuscitation and hemorrhage control interventions may be required. In patients who are nonhypotensive, a narrowed PP is an independent early predictor of AH requiring blood product transfusion and intervention for hemorrhage control.

Question 2

When comparing patients aged $\geq$61 years with younger patients aged 16 to 60 years:

a) There is no difference in the magnitude of pulse pressure (PP) narrowing that predicts active hemorrhage (AH).
b) AH is predicted at a higher cut-off value than in their younger counterparts.
c) AH is predicted at a lower cut-off value than in their younger counterparts.
d) PP measurements are unable to predict AH in patients aged $\geq$61 years.
e) Hypotension occurs before PP narrowing in patients aged $\geq$61 years.

Critique: The PP response varies by age. The vascular system in older patients is unable to physiologically compensate in the same manner as in younger patients. Specifically, PP narrowing will not be as rapid or pronounced. Cutoff analysis of PP values identified a significantly higher risk of AH at a PP cutoff of 55 mmHg (adjusted odds ratio [AOR] 3.44, $p = 0.005$, area under the curve [AUC] 0.955) in patients $\geq$61 years old vs 40 mmHg (AOR 2.73, $p < 0.0001$, AUC 0.940) for patients aged 16 to 60 years.

Question 3

Compared to those without active hemorrhage (AH), patients who had AH had decreased:

a) Ventilator requirement
b) ICU length of stay
c) Hospital length of stay
d) In-hospital survival
e) Operative intervention

Critique: Patients were defined as AH if they were identified as requiring at least 3 units of packed red blood cells in any 60-minute period within 24 hours of admission and required interventional radiology or operation for definitive hemorrhage control. Patients meeting these criteria were critically ill, and this affected their ventilator requirements, length of stay metrics, and survival. In this study, AH patients had a greater number of ventilator days (6 ± 12.5 days vs 0.77 ± 4.1 days, $p < 0.0001$), longer hospital length of stay (22.2 ± 30.8 days vs 7.3 ± 12.3 days, $p < 0.0001$), longer ICU length of stay (11.3 ± 17.3 days vs 2 ± 5.7 days, $p < 0.001$) and a higher rate of in-hospital mortality (31.1% vs 2.4%, $p < 0.0001$) compared with non-AH patients.

Question 4

Which of the following was NOT independently associated with active hemorrhage (AH)?

a) Blunt trauma
b) Narrowed pulse pressure (PP)
c) Increased Injury Severity Score (ISS)
d) Decreased field blood pressure
e) Increasing age

Critique: Several clinical factors were found to be independently associated with AH. This included the mechanism of injury, PP, blood pressure, heart rate, age, and ISS. Increased age (adjusted odds ratio [AOR] 1.01, $p < 0.0001$), penetrating mechanism of injury (AOR 9.476, $p < 0.0001$), lower field systolic blood pressure (AOR 0.985, $p < 0.0001$), increased emergency department (ED) heart rate (AOR 1.024, $p < 0.0001$), increased ISS (AOR 1.136, $p < 0.0001$), and narrowed ED PP (AOR 0.975, $p < 0.0001$) were all found to be independent predictors of AH.

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ANSWERS

Article 1	Article 2
Question 1 _____	Question 1 _____
Question 2 _____	Question 2 _____
Question 3 _____	Question 3 _____
Question 4 _____	Question 4 _____

Evaluation Form

Article 1	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Topics and content were consistent with learning objectives.	O	O	O	O	O
2. Content was relevant to my educational needs.	O	O	O	O	O
3. I will seek additional information on this subject.	O	O	O	O	O
4. The article and questions were relevant to my practice.	O	O	O	O	O
5. Content was fair, objective, and unbiased.	O	O	O	O	O
(Please explain any specific instance[s] of bias or conflict of interest.)					
Article 2					
1. Topics and content were consistent with learning objectives.	O	O	O	O	O
2. Content was relevant to my educational needs.	O	O	O	O	O
3. I will seek additional information on this subject.	O	O	O	O	O
4. The article and questions were relevant to my practice.	O	O	O	O	O
5. Content was fair, objective, and unbiased.	O	O	O	O	O
(Please explain any specific instance[s] of bias or conflict of interest.)					

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